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Subsequently, the in-building upward signal from the terminal side inputted to the internal connection terminal T2 is taken into the ~~[[up-]]~~ down-converter ~~[[20]]~~ 10 via an HPF 34. The HPF 34 prevents the downward signal outputted by the LPF 33 from entering and selectively takes in only the in-building upward signal. Its cutoff frequency is set, for example, to 913 MHz.

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As shown in Fig. 9, in ~~[[a]]~~ an in-building CATV system of the present embodiment, a lead-in wire 105 branched from a tap off 104 of an external bi-directional CATV system constituted from a head end 100, a branch amplifier 102, an extension amplifier 103, the tap off 104 and the like is ~~[[lead]]~~ led into a building B such as a collective residence via a protector 106. A downward signal from the external bi-directional CATV system (the frequency : 54 - 890 MHz) inputted from the lead-in wire 105 is transmitted to plural subscribers' terminals 115 in the building B via a transmission line 111 in the building B, and a bi-directional amplifier 112, a 2-way-splitter 113, a 4-way-splitter 114 and the like provided on the transmission line 111. Additionally an upward signal (in-building up-ward signal) inputted from the terminal ~~[[111]]~~ 115 is transmitted to the lead-in wire 105.

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The downward signal passing circuit 200a is constituted from an LPF 201 for cutting off the in-building upward signal, a unilateral amplifier 202 and an HPF 203 for cutting off the upward signal. The upward signal frequency-conversion circuit 200b is constituted from an ~~[[HPF]]~~ LPF 204 for cutting off the downward signal, a mixer 205, a local signal oscillator 206, a BPF 207, a unilateral amplifier 208, an ATT 209 and an HPF 210 for cutting off the downward signal.

1-19. (CANCELED)

20. (NEW) An in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal;

wherein the noise removal means comprises a trap circuit;

a frequency of the high frequency signal for frequency-conversion is set to a frequency higher than that of the in-building upward signal;

the trap circuit is provided in at least one of the transmission device provided on a transmission path from the down-converter to the each terminal, the up-converter and the down-converter; and

the trap circuit is constituted by connecting a resonance circuit to the transmission path of the in-building upward signal via an inductive reactance.

21. (NEW) An in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal;

wherein the noise removal means comprises a trap circuit;

a frequency of the high frequency signal for frequency-conversion is set to a frequency lower than that of the in-building upward signal;

the trap circuit is provided in at least one of the transmission device provided on a transmission path from the down-converter to the each terminal, the up-converter and the down-converter; and

the trap circuit is constituted by connecting a resonance circuit to the transmission path of the in-building upward signal via a capacitive reactance.

22. (NEW) An in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-

converting an original upward signal outputted from the terminal device to the in-building upward signal;

wherein the noise removal means comprises a trap circuit; and

an equalizer for compensating a transmission loss in the frequency band of the in-building upward signal occurring when the in-building upward signal is passed through the trap circuit is provided on at least one of the transmission path of the in-building upward signal from the up-converter to the down-converter, the transmission path of the upward signal outputted from the terminal device and the transmission path of the upward signal outputted from the down-converter.

23. (NEW) The in-building CATV system according to claim 22, wherein the equalizer is provided on at least one of a transmission line from the down-converter to the each terminal, a path of the in-building upward signal in the transmission device provided on the transmission line, an input path of the upward signal outputted from the terminal device in the up-converter, an output path of the in-building upward signal in the up-converter, an input path of the in-building upward signal in the down converter and an output path of the upward signal frequency-converted from the in-building upward signal in the down-converter.

24. (NEW) A down-converter provided between a lead-in wire from an external bi-directional CATV system and a transmission line in a building, in an in-building CATV system connected to the lead-in wire of the external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, the in-building CATV system, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high

frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal, and the down converter, comprising:

- a downward signal path of the down-converter for transmitting a downward signal inputted from the external bi-directional CATV system via the lead-in wire to the transmission line;

- a high frequency signal generating means of the down-converter for generating a high frequency signal for frequency-converting the in-building upward signal outputted from the up-converter at the terminal side to an upward signal with a frequency lower than that of the downward signal for being transmitted to the external bidirectional CATV system;

- a frequency conversion means of the down-converter for taking the in-building upward signal transmitted from the up-converter via the transmission line, frequency-converting the in-building upward signal to the upward signal for being outputted to the external bi-directional CATV system by mixing the in-building upward signal and the high frequency signal generated by the high frequency signal generating means of the down-converter and transmitting the frequency-converted upward signal to the lead-in wire; and

- a trap circuit provided on an input path of the in-building upward signal to the frequency conversion means of the down-converter.

25. (NEW) A down-converter provided between a lead-in wire from an external bi-directional CATV system and a transmission line in a building, in the in-building CATV system according to claim 22, comprising:

- a downward signal path of the down-converter for transmitting a downward signal inputted from the external bi-directional CATV system via the lead-in wire to the transmission line;

- a high frequency signal generating means of the down-converter for generating a high frequency signal for frequency-converting the in-building upward signal outputted from the up-converter at the terminal side to an upward signal with a frequency lower than that of the downward signal for being transmitted to the external bidirectional CATV system;

- a frequency conversion means of the down-converter for taking in the in-building upward signal transmitted from the up-converter via the transmission line, frequency-

converting the in-building upward signal to the upward signal for being outputted to the external bi-directional CATV system by mixing the in-building upward signal and the high frequency signal generated by the high frequency signal generating means of the down-converter, and transmitting the frequency-converted upward signal to the lead-in wire; and

an equalizer on at least one of an input path of the in-building upward signal to the frequency conversion means of the down-converter and an output path of the frequency-converted upward signal from the frequency-conversion means of down-converter.

26. (NEW) An up-converter provided between a terminal and a subscriber terminal device in an in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, the in-building CATV system, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal, and the up converter, comprising:

a downward signal path of the up-converter for transmitting the downward signal transmitted from the external bi-directional CATV system via the down-converter and the transmission line to the terminal device;

a high frequency signal generating means of the up-converter for generating the high frequency signal for frequency-converting the upward signal outputted from the terminal device to the in-building upward signal in a predetermined frequency band;

a frequency conversion means of the up-converter for taking in the upward signal outputted from the terminal device, frequency-converting the upward signal to the in-building upward signal by mixing the upward signal and the high frequency signal generated by the high frequency signal generating means of the up-converter and outputting the frequency-converted in-building upward signal to the terminal side; and

a trap circuit on the output path of the in-building upward signal from the frequency conversion means of the up-converter.

27. (NEW) An up-converter provided between a terminal and a subscriber terminal device in the in-building CATV system according to claim 22, comprising:

a downward signal path of the up-converter for transmitting the downward signal transmitted from the external bi-directional CATV system via the down-converter and the transmission line to the terminal device;

a high frequency signal generating means of the up-converter for generating the high frequency signal for frequency-converting the upward signal outputted from the terminal device to the in-building upward signal in a predetermined frequency band;

a frequency conversion means of the up-converter for taking in the upward signal outputted from the terminal device, frequency-converting the upward signal to the in-building upward signal by mixing the upward signal and the high frequency signal generated by the high frequency signal generating means of the up-converter and outputting the frequency-converted in-building upward signal to the terminal side; and

an equalizer on at least one of an input path of the upward signal outputted from the terminal device to the frequency conversion means of the up-converter and an output path of the in-building upward signal from the frequency conversion means of the up-converter.

28. (NEW) An amplifier provided on a transmission line from a down-converter to each terminal for amplifying signals flowing through the transmission line in an in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, the in-building CATV system, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal, and the amplifier, comprising:

a downward signal path of the amplifier for transmitting the downward signal transmitted from the down-converter to the terminal;

an in-building upward signal path for transmitting the in-building upward signal transmitted from the up-converter connected to the terminal to the down-converter;

a signal amplification means provided at least on one of the downward signal path of the amplifier and the in-building upward signal path for amplifying at least one of the downward signal and the upward signal flowing through at least one of the downward signal path of the amplifier and the in-building upward signal path; and

a trap circuit on the in-building upward signal path.

29. (NEW) An amplifier provided on a transmission line from a down-converter to each terminal for amplifying signals flowing through the transmission line in the in-building CATV system according to claim 22, comprising:

a downward signal path of the amplifier for transmitting the downward signal transmitted from the down-converter to the terminal;

an in-building upward signal path for transmitting the in-building upward signal transmitted from the up-converter connected to the terminal to the down-converter;

a signal amplification means provided at least on one of the downward signal path of the amplifier and the in-building upward signal path for amplifying at least one



of the downward signal and the upward signal flowing through at least one of the downward signal path of the amplifier and the in-building upward signal path; and

an equalizer on the in-building upward signal path.

30. (NEW) An in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal, wherein the up-converter provided between the terminal and the terminal device comprises:

a downward signal path for transmitting the downward signal transmitted from the external bidirectional CATV system via the down-converter and the transmission line to the terminal device;

an upward signal path for transmitting the upward signal outputted from the terminal device to the terminal;

a high frequency signal generating means for generating the high frequency signal for frequency-converting the upward signal outputted from the terminal device to the in-building upward signal in a predetermined frequency band; and

a frequency conversion means for frequency-converting the upward signal from the terminal device to the in-building upward signal by mixing the upward signal transmitted from the terminal device side of the upward signal path and the high frequency signal generated by the high frequency signal generating means and for

transmitting the in-building upward signal to the terminal side of the upward signal path;  
and

the noise removal means is provided in the up-converter and comprises a high frequency signal removal means for removing a leak-out high frequency signal from the upward signal path by mixing the leak-out high frequency signal leaking out to the terminal side on the upward signal path together with the in-building upward signal when the frequency conversion means frequency-converts with a phase-inverted high frequency signal whose phase is inverted against a phase of the high frequency signal generated by the high frequency signal generating means and by offsetting the leak-out high frequency signal by the phase-inverted high frequency signal.

31. (NEW) The in-building CATV system according to claim 30, wherein the high frequency signal removal means comprises:

a high frequency signal branch means for branching the high frequency signal generated by the high frequency signal generating means and transmitted to the frequency conversion means; and

a phase-inverted high frequency signal mixing means for mixing the phase-inverted high frequency signal made by phase-inverting the high frequency signal branched by the high frequency signal branch means with the high frequency signal transmitted through the upward signal path.

32. (NEW) The in-building CATV system according to claim 30, wherein the high frequency signal removal means comprises:

a level adjusting means for adjusting the level of the phase-inverted high frequency signal so that the level of the phase-inverted high frequency signal becomes nearly the same as the level of the high frequency signal transmitted through the upward signal path.

33. (NEW) An up-converter provided between a terminal and a terminal device in the in-building CATV system according to claim 30, comprising:

a downward signal path for transmitting the downward signal from the external bi-directional CATV system transmitted via the down-converter and the transmission line to the terminal device;

an upward signal path for transmitting the upward signal outputted from the terminal device to the terminal;

a high frequency signal generating means for generating the high frequency signal for frequency-converting the upward signal outputted from the terminal device to the in-building upward signal in a predetermined frequency band;

a frequency conversion means for frequency-converting the upward signal from the terminal device to the in-building upward signal by mixing the upward signal transmitted from the terminal device side of the upward signal path with the high frequency signal generated by the high frequency signal generating means and for transmitting the in-building upward signal to the terminal side of the upward signal path; and

the noise removal means including a high frequency signal removal means;

wherein the high frequency signal removal means removes a leak-out high frequency signal from the upward signal path by mixing the leak-out high frequency signal leaking out to the terminal side on the upward signal path together with the in-building upward signal when the frequency conversion means frequency-converts with the phase-inverted high frequency signal whose phase is inverted against the phase of the high frequency signal generated by the high frequency signal generating means and by offsetting the leak-out high frequency signal by the phase-inverted high frequency signal.

34. (NEW) The up-converter according to claim 33, wherein the high frequency signal removal means comprises:

a high frequency signal branch means for branching the high frequency signal generated by the high frequency signal generating means and transmitted to the high frequency conversion means; and

a phase-inverted high frequency signal mixing means for mixing the phase-inverted high frequency signal made by phase-inverting the high frequency signal branched by the high frequency signal branch means with the high frequency signal transmitted through the upward signal path.

35. (NEW) The up-converter according to claim 33, wherein the high frequency signal removal means comprises:

a level adjusting means for adjusting level of the phase-inverted high frequency signal so that the level of the phase-inverted high frequency signal becomes nearly the same as level of the high frequency signal transmitted through the upward signal path.

36. (NEW) An in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal;

wherein the noise removal means comprises a resonance circuit for reducing the high frequency signal.

37. (NEW) An in-building CATV system connected to a lead-in wire of an external bi-directional CATV system for transmitting a downward signal inputted from the lead-in wire to plural terminals in a building, comprising:

an up-converter for frequency-converting an upward signal outputted from a subscriber terminal device to an in-building upward signal having a frequency higher than that of the downward signal and for transmitting the in-building upward signal toward the lead-in wire from each terminal via a transmission line;

a down-converter provided between the transmission line and the lead-in wire for frequency-converting the in-building upward signal to an upward signal with a frequency lower than that of the downward signal for outputting to the external bi-directional CATV system and for transmitting a frequency-converted upward signal to the external bi-directional CATV system via the lead-in wire; and

a noise removal means provided on a transmission path of the in-building upward signal from the up-converter to the down-converter for removing a high

frequency signal with a specific frequency used in the up-converter for frequency-converting an original upward signal outputted from the terminal device to the in-building upward signal;

wherein the noise removal means comprises a high frequency signal removal means for removing a leak-out high frequency signal from an upward signal path by mixing the leak-out high frequency signal leaking out on the upward signal path of the in-building upward signal together with the in-building upward signal in the high frequency signal with a phase-inverted high frequency signal whose phase is inverted against a phase of the high frequency signal and by offsetting the leak-out high frequency signal by the phase-inverted high frequency signal.

38. (NEW) The in-building CATV system according to claim 36, wherein the up-converter is constituted to frequency-convert the upward signal outputted from the terminal device using a high frequency signal for frequency-converting the upward signal and

the down converter is constituted to frequency-convert the in-building upward signal using the high frequency signal for frequency-converting the upward signal.

39. (NEW) The in-building CATV system according to claim 37, wherein the up-converter is constituted to frequency-convert the upward signal outputted from the terminal device using a high frequency signal for frequency-converting the upward signal and

the down converter is constituted to frequency-convert the in-building upward signal using the high frequency signal for frequency-converting the upward signal.